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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/817,622	03/26/2001	Anwar Chitayat	99AN122-E	8382

7590 08/21/2006

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EXAMINER	
MULLINS, BURTON S	

ART UNIT	PAPER NUMBER
2834	

DATE MAILED: 08/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/817,622	Applicant(s) CHITAYAT ET AL.	
	Examiner Burton S. Mullins	Art Unit 2834	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 June 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4 and 6-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4 and 6-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 March 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. Claims 1-4, 6-10 and 17-21 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. The recitation "the first set of coils positioned on the motor support and the second set of coils located on the plunger" is new matter not disclosed in the specification as originally filed. The specification teaches first and second coils 15a/15b located on the support, i.e. in laminations 13 (p.6, line 7-29; Fig.1a) or resin (p.8, lines 12-24; Figs.3a-3b&8). In co-operation with magnets 25 located on the plunger 26, the first and second coils 15a/15b form z- and Θ–axis motors 45 and 46. Alternatively, the coils or "motors" may be located on the plunger 26 while the magnets 25 are on the support (p.10, lines 9-12). However, there is no teaching or suggestion that the first coil is on the support while the second coil is on the plunger. Similarly, there is no teaching or suggestion that the magnets 25 which would co-operate with such an arrangement of coils are located on both the support and the plunger.

Similarly, the recitation in claim 17 of "the first set of coils positioned on an outside surface of the plunger and the second set of coils positioned on an inside surface of a motor support" is new matter.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "first set of coils positioned on the motor support and [a] second set of coils located on the plunger" (claim 1) or "the first set of coils positioned on an outside surface of the plunger and the second set of coils positioned on an inside surface of a motor support" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 11-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sudo et al. (US 4,644,205) in view of Chitayat (US 5,777,402), Spinner et al. (US 5,771,174) and Mizutani (US 5,532,533). Sudo teaches a rotary-linear actuator system, comprising: a motor support (stationary member 12) having a well (Fig.2); a plunger (floating member 14) supported via (electromagnetic) bearings for movement in at least part of the well so as to enable axial movement of the plunger relative to the well along a longitudinal axis of the plunger and rotational movement of the plunger about the longitudinal axis; an array of magnets (34a-34d/36a-36d) associated with the plunger (Fig.2), wherein half of the magnets are oriented such that their north poles point radially outward and the other half radially inward (Fig.7); a first set of coils 42/44 (Fig.2) arranged to, when energized, apply an electric field that interacts with the array of magnets and provides an axial force to drive the plunger element in a linear mode (c.3, line 32); a second set of coils 50a-50h (Fig.2) arranged to, when energized, apply an electric field that interacts with the array of magnets and provides a tangential force to drive the plunger element in a rotational mode (c.3, line 47); and an integrated control system 66 which selectively energizes the first and second sets of coils to effect movement of the plunger in at least one of the linear and rotational modes.

Sudo does not teach: 1) a permanent magnet array arranged as alternating columns of alternating polarity; 2) a network interface operative to receive control information via an

associated network, or 2) an integrated control system and an associated rotary-linear motor "integrated into an single module."

Regarding (1), Chitayat teaches a two-axis motor with a high-density magnet array comprising a cylindrical motor (Fig.14b; c.11, line 41-c.12, line 5) including an array of permanent magnets 301/302 associated with a plunger (c.12, lines 15-17; Figs.13a-13c), half of the magnets oriented such that their north poles point radially outward and the other half such that their north poles point radially inward (c.12, lines 17-22; Figs.13a-13c), the array arranged as alternating columns of alternating polarity (Figs.13a-13c). Chitayat's cylindrical linear/rotary motor's alternating magnet array packs the magnets such that flux density increases, thereby increasing the peak motive force on the plunger and allow for a greater air gap (c.1, lines 18-23).

Regarding (2), Spinner teaches a distributed intelligence control system for controlling plural actuators 26 and respective intelligent actuator controllers 30 connected by connections 32 via a network bus 24, gateway 22 and Ethernet/LAN network 21 to a host control system 20 (Fig.1). Each intelligent actuator controller 30 is "preferably mounted on the body of the actuator [26]" and is thus "integrated" with the actuator (c.3, lines 58-60; Fig.1). Further, each actuator controller 30 comprises a communications transceiver 72 (Fig.4). The communications transceiver 72 handles communications between the actuator communications interface of the gateway 22 and the controller processor section 70 (c.5, lines 44-50). Thus, each transceiver 72 comprises a "network interface" since communication passing from an actuator controller to the network 21 and host control system 20, or vice versa, travels through the transceiver. Note further that each transceiver 72 is integrated with an actuator controller 30 since it comprises one of five parts of the controller 30 (c.5, lines 39-44). An Ethernet/LAN network as in Spinner is

desirable as a means of communication between a central host controller and a series of actuators (c.2, lines 49-52), with the "network interface" comprising transceiver 72 desirable as a means of handling that communication (c.5, lines 44-47).

Regarding (3), Mizutani teaches a servo motor integral with its control apparatus. Specifically, printed circuit board 58 is fitted to a portion extending in the radial direction of bearing 5 from the housing 51b and is loaded with power circuit 31 and signal processing circuit 24. A printed circuit board 60 is layered with the printed circuit 58 via a spacer 33 and is loaded with control circuit 32 and fixed to chassis 51 (c.6, lines 42-49). Among other advantages (c.11, lines 6-67), the integration of the control with the motor does not require sockets and terminals (c.8, lines 41-43); the heat generated by switching loss, etc., of the transistors in the power circuit may be transmitted to cooling fins, to improve cooling efficiency (c.8, lines 53-59); and water and/or oil is prevented from entering parts of the circuit (c.9, lines 16-20; 30-41).

It would have been obvious to one of ordinary skill at the time of the invention to modify Sudo and provide: 1) a permanent magnet array arranged as alternating columns of alternating polarity per Chitayat since this would have increased flux density, thereby increasing the peak motive force on the plunger and allow for a greater air gap; 2) a network interface per Spinner since this would have been a desirable means of handling communication between a central host and an actuator; and 3) an integrated control system and associated rotary-linear motor into an single module per Mizutani since this would have been desirable to facilitate assembly, improve cooling efficiency and prevent water and/or oil from entering.

Regarding claim 12, the communications interface of Spinner including transceiver 72 uses a network protocol such as the "LonTalk" protocol of Echelon Corp. (c.5, line 66-c.6, line 4).

Regarding claim 13, the control information in Spinner's system includes program data, the operating parameters of the rotary-linear actuator system being programmed based on the program data (c.6, lines 5+).

Regarding claim 14, Spinner's system senses conditions, e.g. position and state status, of the actuators and provides a sensor signal indicative of the sensed at least one condition (c.7, lines 9-29), which is sent from the actuator to the computer 20 via the network interface 72 and gateway 22 using the network protocol (c.5, line 66-c.6, line 4).

Regarding claim 15, the control information in Spinner's system includes program data (algorithm parameters given in c.6, lines 44-60) to program the operating parameters of at least part of the actuator based on evaluation of the condition data sent from the actuator.

5. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sudo et al. (US 4,644,205) in view of Chitayat (US 5,777,402), Spinner et al. (US 5,771,174), Gerard (US 4,751,437) and Mizutani (US 5,532,533). Sudo teaches a rotary-linear actuator system, comprising: a motor support (stationary member 12) having a well (Fig.2); a plunger (floating member 14) supported for movement in at least part of the well so as to enable axial movement of the plunger relative to the well along a longitudinal axis of the plunger and rotational movement of the plunger about the longitudinal axis; an array of magnets (34a-34d/36a-36d) associated with the plunger (Fig.2); a first set of coils 42/44 (Fig.2) arranged to, when energized, apply an electric field that interacts with the array of magnets and provides an axial force to drive

the plunger element in a linear mode (c.3, line 32); a second set of coils 50a-50h (Fig.2) arranged to, when energized, apply an electric field that interacts with the array of magnets and provides a tangential force to drive the plunger element in a rotational mode (c.3, line 47); and an integrated control system 66 which selectively energizes the first and second sets of coils to effect movement of the plunger in at least one of the linear and rotational modes. Regarding the means plus function clauses in claim 16, Sudo teaches a means for supporting the motor and means for supporting the (electromagnetic) bearing comprising stationary member 12 (Fig.2), the means for supporting the motor defining a well (Fig.2), in which electromagnetic bearings (magnets 34a-34d/36a-36d) are supported (Fig.2); means for moving a stage (32) comprising plunger or floating member 14 received in the well (Fig.2); the plunger 14 axially- and rotatably-moveable along its longitudinal axis (c.3, lines 25-38); means for providing a magnetic field comprising magnets 34a-34d/36a-36d arranged on the means for moving the stage (plunger) 14; and means for applying a substantially axial and tangential force on the magnet and driving the stage linearly and rotationally, respectively, comprising coils 42/44 and 50a-50h (c.3, line 32-47).

Sudo does not teach: 1) means for providing the magnetic field constructed as a "mesh" with alternating rows of polarity...and the means for applying a substantially axial force embedded in a resin; 2) "plural motors" and "control means including means for interfacing with an associated network and receiving control information to program the control means to control the means for amplifying to selectively activate the means for applying, and transmitting diagnostic information to at least one computer associated with the network"; 3) a means for amplifying an electrical signal; and 4) a control means "integrate[d]" with the associated rotary-linear motor "into an single module".

Regarding (1), the term "mesh" has been given no particular structural significance other than referring to the alternating arrangement of magnets, e.g. as shown in Figs.6a-6c of the specification. Regarding such an array, Chitayat teaches a two-axis motor with high density magnetic platen comprising a cylindrical motor (Fig.14b; c.11, line 41-c.12, line 5) including an array of permanent magnets 301/302 associated with a plunger (c.12, lines 15-17; Figs.13a-13c), half of the magnets are oriented such that their north poles point radially outward and the other half such that their north poles point radially inward (c.12, lines 17-22; Figs.13a-13c), the array arranged as alternating columns of alternating polarity (Figs.13a-13c). Chitayat's linear-rotary motor magnet arrangement packs the magnets such that flux density increases, thereby increasing the peak motive force on the plunger and allow for a greater air gap (c.1, lines 18-23). Regarding the feature of means for applying an axial force embedded in a resin, Chitayat teaches that motor coils 347 in a thin, coreless embodiment are embedded in an epoxy resin bed 346 (c.8, lines 21-25; Figs.8a-8b; 9a). The coils are the means of applying both rotary and axial force in the rotary/axial, cylindrical motor. Embedding the coils enables one of ordinary skill to avoid having to use high-permeability material inside the motor coils 347, thus reducing cogging, since magnetic (high permeability) materials are not immediately adjacent the rotor magnets 301/302 (c.8, lines 34-36).

Regarding (2), Spinner teaches a distributed intelligence control system for controlling plural actuators 26 and respective intelligent actuator controllers 30 connected by connections 32 via a network bus 24, gateway 22 and Ethernet/LAN network 21 to a host control system 20 (Fig.1). Each intelligent actuator controller 30 is "preferably mounted on the body of the actuator [26]" and is thus "integrated" with the actuator (c.3, lines 58-60; Fig.1). Further, each

actuator controller 30 comprises a communications transceiver 72 (Fig.4). The communications transceiver 72 handles communications between the actuator communications interface of the gateway 22 and the controller processor section 70 (c.5, lines 44-50). Thus, each transceiver 72 comprises a "network interface" since communication passing from an actuator controller to the network 21 and host control system 20, or vice versa, travels through the transceiver. Note further that each transceiver 72 is integrated with an actuator controller 30 since it comprises one of five parts of the controller 30 (c.5, lines 39-44). An Ethernet/LAN network as in Spinner is desirable as a means of communication between a central host controller and a series of actuators (c.2, lines 49-52), with the "network interface" comprising transceiver 72 desirable as a means of handling that communication (c.5, lines 44-47). Regarding claim 16, Spinner further teaches plural actuators 26 mounted on support (slice lip) 28 (Fig.2, c.3, lines 51-52) with, as noted above, plural actuators 26 and respective intelligent actuator control means 30 including means for interfacing with an associated network 21 and host control system 20 comprising transceivers 72 (Fig.1). Various diagnostics (parameters, c.6, lines 19-61, or other information, c.7, lines 9-28) are transmitted by the control means 30 to the gateway 22 and host control 20.

Regarding (3), Gerard teaches a linear motor and servo loop drive circuit (Fig.1) including an amplifier 40 which supplies current to the coil 28 (c.3, lines 40-41).

Regarding (4), Mizutani teaches a servo motor integral with its control apparatus. Specifically, printed circuit board 58 is fitted to a portion extending in the radial direction of bearing 5 from the housing 51b and is loaded with power circuit 31 and signal processing circuit 24. A printed circuit board 60 is layered with the printed circuit 58 via a spacer 33 and is loaded with control circuit 32 and fixed to chassis 51 (c.6, lines 42-49). Among other advantages (c.11,

lines 6-67), the integration of the control with the motor does not require sockets and terminals (c.8, lines 41-43); the heat generated by switching loss, etc., of the transistors in the power circuit may be transmitted to cooling fins, to improve cooling efficiency (c.8, lines 53-59); and water and/or oil is prevented from entering parts of the circuit (c.9, lines 16-20; 30-41). See also the Board Decision (01 May 2006) pp.10-11, where the new grounds of rejection cited Mizutani as teaching a single module integrated motor control structure "to reduce the amount of wire harnesses required for control communication" (p.10).

It would have been obvious to one of ordinary skill at the time of the invention to modify Sudo and provide: 1) means for providing the magnetic field constructed as a "mesh" with alternating rows of polarity...and the means for applying a substantially axial force embedded in a resin per Chitatyat since this would have increased the peak motive force on the plunger and reduced cogging, respectively; 2) a "network interface" including "means for interfacing with an associated network and receiving control information to program the control means to control the means for amplifying to selectively activate the means for applying, and transmitting diagnostic information to at least one computer associated with the network" per Spinner since this would have been a desirable means of handling communication between a central host and an actuator; 3) an amplifier in the drive control per Gerard since amplifiers would have been desirable to supply current to the coils; and 4) a control system integrated with the associated rotary-linear motor into an single module per Mizutani since this would have been desirable to reduce the amount of wire harnesses required for control communication.

6. Claims 22-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sudo in view of Chitayat (US 5,777,402), Horikoshi et al. (US 5,142,172), Gerard (US 4,751,437),

Spinner et al. (US 5,771,174) and Mizutani (US 5,532,533). Sudo teaches an integrated rotary-linear actuator system, comprising: a plunger (floating member) 14 movable along and rotatable about a longitudinal axis extending through the plunger (Fig.10), wherein the plunger includes an inner 28 and an outer 26 cylindrical portion open at one end (see Fig.10) with permanent magnets 34a/36a and 100a/102a attached to the respective inner walls of the inner and outer cylindrical portions 28 and 26 (Fig.10); and a coil system having coils 42/44/50a/50b (Fig.10) arranged to, when energized, interact with the magnets 34a/36a/100a/102a attached to the plunger 14 to move the plunger in rotational mode and linear modes.

Sudo does not teach: 1) permanent magnets arranged in rows of alternating polarity; 2) air bearings supporting the plunger against an actuator support stage; 3) an amplifier coupled to the coils to provide electric energy to the coils; 4) a control system with an associated rotary-linear actuator having a network interface for receiving and transmitting at least one of control and diagnostic information to an associated network; and 5) a control system…"integrated into a single module".

Regarding (1), Chitayat teaches a two-axis motor with a high-density magnet array comprising a cylindrical motor (Fig.14b; c.11, line 41-c.12, line 5) including an array of permanent magnets 301/302 associated with a plunger (c.12, lines 15-17; Figs.13a-13c), half of the magnets oriented such that their north poles point radially outward and the other half such that their north poles point radially inward (c.12, lines 17-22; Figs.13a-13c), the array arranged as alternating columns of alternating polarity (Figs.13a-13c). Chitayat's cylindrical linear/rotary motor's alternating magnet array packs the magnets such that flux density increases, thereby increasing the peak motive force on the plunger and allow for a greater air gap (c.1, lines 18-23).

Regarding (2), Horikoshi teaches a gas bearing 1 used to support a shaft 3 of a voice coil 13 at a desired position (c.1, lines 36-42).

Regarding (3), Gerard teaches a linear motor and servo loop drive circuit (Fig.1) including an amplifier 40 which supplies current to the coil 28 (c.3, lines 40-41).

Regarding (4), Spinner teaches a distributed intelligence control system for controlling plural actuators 26 and respective intelligent actuator controllers 30 connected by connections 32 via a network bus 24, gateway 22 and Ethernet/LAN network 21 to a host control system 20 (Fig.1). Each intelligent actuator controller 30 is "preferably mounted on the body of the actuator [26]" and is thus "integrated" with the actuator (c.3, lines 58-60; Fig.1). Further, each actuator controller 30 comprises a communications transceiver 72 (Fig.4). The communications transceiver 72 handles communications between the actuator communications interface of the gateway 22 and the controller processor section 70 (c.5, lines 44-50). Thus, each transceiver 72 comprises a "network interface" since communication passing from an actuator controller to the network 21 and host control system 20, or vice versa, travels through the transceiver. Note further that each transceiver 72 is integrated with an actuator controller 30 since it comprises one of five parts of the controller 30 (c.5, lines 39-44). An Ethernet/LAN network as in Spinner is desirable as a means of communication between a central host controller and a series of actuators (c.2, lines 49-52), with the "network interface" comprising transceiver 72 desirable as a means of handling that communication (c.5, lines 44-47).

Regarding (5), Mizutani teaches a servo motor integral with its control apparatus. Specifically, printed circuit board 58 is fitted to a portion extending in the radial direction of bearing 5 from the housing 51b and is loaded with power circuit 31 and signal processing circuit

24. A printed circuit board 60 is layered with the printed circuit 58 via a spacer 33 and is loaded with control circuit 32 and fixed to chassis 51 (c.6, lines 42-49). Among other advantages (c.11, lines 6-67), the integration of the control with the motor does not require sockets and terminals (c.8, lines 41-43); the heat generated by switching loss, etc., of the transistors in the power circuit may be transmitted to cooling fins, to improve cooling efficiency (c.8, lines 53-59); and water and/or oil is prevented from entering parts of the circuit (c.9, lines 16-20; 30-41). See also the Board Decision (01 May 2006) pp.10-11, where the new grounds of rejection cited Mizutani as teaching a single module integrated motor control structure "to reduce the amount of wire harnesses required for control communication" (p.10).

It would have been obvious to one of ordinary skill at the time of the invention to modify Sudo and provide: 1) permanent magnets arranged in rows of alternating polarity per Chitayat since this would have increased flux density, thereby increasing the peak motive force on the plunger and allow for a greater air gap; 2) a gas bearing per Horikoshi since this would have been desirable to support the plunger at a desired position; 3) an amplifier in the drive control per Gerard since amplifiers would have been desirable to supply current to the coils; 4) a network interface per Spinner since this would have been a desirable means of handling communication between a central host and an actuator; and 5) a control system..."integrated into a single module" per Mizutani since this would have reduced the amount of wire harnesses required for control communication.

Regarding claim 23, each actuator motor 26 in Spinner includes an integrated linear variable differential transformer 38, a well-known displacement measuring device (c.4, lines 4-6). This would determine the position of the plunger.

Regarding claims 24 and 26, Spinner includes a computer (host control system) 20 which communicates control information to the control system of each actuator via the network (Ethernet or LAN) 21.

Regarding claims 25 and 27, Spinner's host computer 20 retrieves diagnostic information of the actuators via the network (c.3, lines 46-50 & c.4, lines 23-30), and also "calibrates" the actuators by calculating new setpoint parameters and transmitting these to the actuators (c.4, lines 43-47).

Allowable Subject Matter

7. Claims 1-4, 6-10 and 17-21 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 1st paragraph, set forth in this Office action. The prior art rotary/linear actuators do not teach, inter alia, a "first set of coils positioned on the motor support and [a] second set of coils located on the plunger" (claim 1) or "the first set of coils positioned on an outside surface of the plunger and the second set of coils positioned on an inside surface of a motor support" (claim 17). In the prior art, the sets of energizing coils are located either on the moveable plunger (rotor) or the stationary support (stator), not on both.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Burton S. Mullins whose telephone number is 571-272-2029. The examiner can normally be reached on Monday-Friday, 9 am to 5 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Darren Schuberg can be

reached on 571-272-2044. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Burton S. Mullins
Primary Examiner
Art Unit 2834

bsm
15 August 2006